

Aditya Saraf

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<https://adityasaraf.github.io/>

RESEARCH INTERESTS

Economics and Computer Science, Behavioral Economics, Game Theory, Matching Markets, Differential Privacy, Complexity Theory

EDUCATION

UNIVERSITY OF WASHINGTON, Seattle, WA June 2020

Master of Science in Computer Science, GPA: 3.98

UNIVERSITY OF WASHINGTON, Seattle, WA June 2019

Bachelor of Science in Computer Engineering, Magna cum laude, GPA: 3.86

- Minor: Philosophy
- Phi Beta Kappa (ΦBK) member

RESEARCH EXPERIENCE

TIME-INCONSISTENCY IN COMPETITIVE PLANNING PROBLEMS December 2019–current

With Anna Karlin and Jamie Morgenstern (UW)

- Analyzed a model of present bias (i.e. procrastination) in graph-based planning problems introduced by Jon Kleinberg et al. Existing work shows that present bias can result in exponentially higher cost compared to optimal behavior
- Added competition between multiple biased agents to the model; we aim to show that competition alleviates some of the harms of present bias, and can naturally guide agents towards optimal behavior
- Canonical applications include businesses competing to get to market first, incentivizing students to complete assignments, incentivizing customers to join and use gym facilities, etc.

QUALITATIVE PROBABILITY FOR STATISTICAL PRINCIPLES January 2019–current

With Conor Mayo-Wilson (UW)

- Work within a formal system of qualitative conditional probability to prove statistical principles
- Show that Bayesian foundations (of algorithms, decision theory, etc.) apply even when agents might lack quantitative degrees of belief.
- Presented our initial findings at FEW (Formal Epistemology Workshop) 2019.

DISTRIBUTED PRIVACY FOR CORRELATED DATA October 2019–June 2020

With Grant Schoenebeck (UMich) and Jie Gao (Rutgers)

- Work with a recent generalization of differential privacy called Bayesian differential privacy, which protects against a wider class of adversaries than standard differential privacy
- Analyze highly correlated data sets, where traditional differential privacy falls short
- Create sanitized datasets for offline analysis, to enable “local” privacy that works even in distributed settings.
- We prove near optimality of our mechanism for our specific setting.

MODELING ALTRUISM IN DYNAMIC KIDNEY EXCHANGES September 2018–March 2019

With John Dickerson (UMD)

- We use dynamic matching markets to model kidney exchanges, quantifying the increase in productivity from altruistic donors. We aim to both prove theoretical bounds and propose practical policies.
- Model the effect of a “kidney voucher” system proposed by the National Kidney Registry to encourage donations

COMPLEXITY OF HIDDEN GRAPH PROPERTIES June 2018–current (revisions ongoing)

With Aarthi Sundaram (UMD)

- Worked in a unique property testing framework where an oracle *hides* access to the graph
- Analyzed the relative complexity of various classes of hidden graph properties and developed a transfer theorem from graph properties in the hidden setting to constraint satisfaction problems in the standard setting

TECH POLICY LAB September 2016–June 2017

With Emily McReynolds (UW)

- Researched privacy and security concerns around upcoming technologies in the fields of autonomous vehicles, the Internet of Things, and cell-site simulators
- Co-authored “Toys that Listen: A Study of Parents, Children, and Internet-Connected Toys”, published in CHI’17

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SIGNIFICANT PAPERS

1. **Aditya Saraf**. *Competition Alleviates Present Bias in Task Completion*. Master's Thesis.
2. Darshan Chakrabarti, Jie Gao, **Aditya Saraf**, Grant Schoenebeck, Fang-Yi Yu. *Optimal Local Bayesian Differential Privacy over Markov Chains*. In submission.
3. **Aditya Saraf**, Tommy Schneider, Aarthi Sundaram. *Trial and Error for Graph Properties*. Working Draft.
4. Conor Mayo-Wilson, **Aditya Saraf**, *QUOL: Qualitative, Objective Likelihoodism*. Presented at FEW 2019.
5. Conor Mayo-Wilson, **Aditya Saraf**. *New Foundations for Bayesian Statistics*. In review for the Philosophy of Science Association 2020
6. Emily McReynolds, Sarah Hubbard, Timothy Lau, **Aditya Saraf**, Maya Cakmak, and Franziska Roesner. 2017. *Toys that Listen: A Study of Parents, Children, and Internet-Connected Toys*. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17). ACM, New York, NY, USA, 5197-5207.

Drafts of these papers (and more) can be found on my website: <https://adityasaraf.github.io/>

TEACHING EXPERIENCE

CSE 311: **FOUNDATIONS OF COMPUTING I**, UW, Instructors: Kevin Zatloukal, Emina Torlak September–December 2018
The first class in the major, teaching the basics of logic, discrete math, and formal languages.

CSE 421: **INTRODUCTION TO ALGORITHMS**, UW, Instructors: Various Spring '18, Winter '19, Spring '19
An upper division algorithms class taught primarily to juniors/seniors.

CSE 490C: **CRYPTOGRAPHY**, UW, Instructor: Huijia (Rachel) Lin September 2019–December 2019
An upper division class on formal cryptography.

CSE 590/490Z: **INCENTIVES IN COMPUTER SCIENCE**, UW, Instructor: Anna Karlin January 2020–June 2020
A class for master's students and advanced undergraduates that surveys topics between economics and computation.

INDUSTRY EXPERIENCE

AMAZON, Seattle, WA June 2017–September 2017
Exports and Expansion Technology – Customer Experience

Software Development Engineer Intern

- Created a full stack application with Spring MVC (Java), including a web-based frontend server and a RESTful backend service.
- Had end-to-end ownership – discovered (internal) customer requirements; planned and designed the application; developed, tested and deployed the application to production.
- Reduced deployment cycle from 2-4 weeks to instant changes to production.